Prevalence of Microscopic Hematuria in a Sector of Egyptian Population

A Thesis

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بسم الله الرحمن الرحيم

قَالُوا سُبْحَانكَ لاَ علِمَ لَنَا إِلاّ مَا

عَلّمْتَنَا إِنَّكَ أَنتَ الْعَلِيمُ الْحَكِيمُ

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Smaher Said Ali

List of Contents

List of Abbreviations

ACE inhibitors	Angiotensin converting enzyme inhibitor
ANCAs	antineutrophil cytoplasmic antibodies
BPH	Benign prostatic hyperplasia
cANCA	Cytoplasmic staining Anti-Neutrophil Cytoplasmic Antibodies
COL4	Type IV Collagen
CRP	C-reactive protein
CT	Computed tomography
CYC	Cyclophosphamide
DHT	Dihydrotestosterone
DMSA scan	Dimercaptosuccinic acid scintigraphy
EPEC	Enteropathogenic Escherichia coli
ERTs	Enzyme Replacement Therapies
ESR	Erythrocyte sedimentation rate
ESWL	Extracorporeal shock wave lithotripsy
GBM,	Glomerular basement membrane
GLA	Alpha-Galactosidase activity;
GN	Glomerulonephritis
HPF	High Power Field
HS	Highly significant
HSP	Henoch-Schönlein purpura
IgA	Immune Globulin A
IL-2	Interleukin-2
IV	Intravenous
IVP	Intravenous pyelogram
IVU	IV urogram
KUB X-ray	Kidney, Ureter, Bladder-X ray

LPHS	Loin pain hematuria syndrome
MH	Microscopic Hematuria
MRI	Magnetic resonance imaging
MSU	Mid-stream specimen of urine
NS	Insignificant
NSAIDs	Non-Steroidal Anti-inflammatory Drug
OTC	Over the counter
PO	PER Oral
PSA	Prostate Specific Antigen
PTH	Parathyroid hormone
RBCs	Red Blood Cells
RCC	Renal cell carcinoma
S	Significant
TAO	Thromboangiitis obliterans
TBMD	Thin basement membrane disease
U/S	Ultrasonography
UPJ	Ureteral Pelvic Junction
UTI	Urinary tract infections
VCUG	Voiding cystourethrogram
VHS	Very highly significant
WG	Wegener's granulomatosis
χ^2	Chi Square

List of Tables

List of Figures

Introduction

Microscopic hematuria without proteinuria is often incidental finding. Since bleeding may arise from any site along the urinary tract, it has a broad different diagnosis, possibly reflecting an entirely benign cause, such as vigorous exercise just before urine collection, or a malignant, potentially lethal disease, such as bladder or renal cancer ***(Cohen and Brown, 2003).***

Macroscopic hematuria (i.e. blood visible in the urine). The urine is pink, red, or dark brown and may contain small or large blood clots. The amount of blood in the urine doesn't necessarily indicate the seriousness of the underline problem. As a little as 1 milliliter (0.03 ounces) of blood will turn the urine red ***(Keen and Da Costa, 2009).***

Microscopic hematuria was defined as greater than 3 RBCs / HPF on two microscopic urine analysis without recent exercise, menses, sexual activity or instrumentation ***(Wollin and Laroch et al., 2008)***.

The most important causes of microscopic hematuria are glomerular and non glomerular. The glomerular causes are IgA nephropathy, thin basement membrane disease, Hereditary nephritis, and mild focal glomerular nephritis of other causes. The non-glomerular causes are upper urinary tract and lower urinary tract causes. The upper urinary tract includes nephrolithiasis,

pyelonephritis, polycystic kidney disease, medullary sponge kidney, and renal trauma. lower urinary tract include cystitis, prostatitis, and urethritis, benign bladder and ureteral polyps and tumors, bladder cancer, prostate cancer, and exercise hematuria ***(Cohen and Brown, 2003).***

Common causes of macroscopic hematuria benign familial hematuria are urinary schistosomiasis, IgA nephropathy, kidney stone, bladder cancer, renal cell carcinoma, nephritic syndrome, arteriovenous malformation of kidney. uretral pelvic junction obstruction, and urinary tract infection ***(Keen and Chalmer, 2009).***

Aim of the Work

To assess the prevalence of microscopic hematuria among sector of Egyptian population.

Hematuria

Hematuria is defined as the presence of 3 or more RBCs per high-power field in 3 of 3 consecutive centrifuged specimens obtained at least 1 week apart ***(Higashihara et al., 2008).***

In the office setting, a positive reaction on the urine dipstick test is usually the first indication of the presence of hematuria. Hematuria can be gross (the urine is overtly bloody, smoky, or tea colored) or microscopic. It may be symptomatic or asymptomatic, transient or persistent, and either isolated or associated with proteinuria and other urinary abnormalities ***(Tu and Shortliffe, 2010).***

Pathophysiology:

The etiology and pathophysiology of hematuria vary. For instance, hematuria of glomerular origin may be the result of a structural disruption in the integrity of glomerular basement membrane caused by inflammatory or immunologic processes. Chemicals may cause toxic disruptions of the renal tubules, whereas calculi may cause mechanical erosion of mucosal surfaces in the genitourinary tract, resulting in hematuria ***(Quigley, 2008).***

Epidemiology:

The prevalence of asymptomatic microscopic haematuria varies from 0.19% to as high as 21% ***(Rodgers et al., 2006).***

In one study of 1,000 patients with haematuria (but no proteinuria), the common causes of haematuria were inflammatory conditions of the urethra and prostate, benign prostatic hypertrophy, cystitis, transitional carcinoma of the bladder, and stones in the renal pelvis or ureter. 8% had some form of renal tract malignancy ***(Grossfeld et al., 2001a).***

Classification of hematuria:

There are two basic types of hematuria:

- Microscopic hematuria refers to blood present in the urine in amounts so small that it can be seen only under a microscope. some doctors consider hematuria to be present when more than 2 to 3 RBCs per sample are found
- Gross (or macroscopic) hematuria is visible to the naked eye. The urine may be pink or red. It may even contain small blood clots.

Differential diagnosis:

Other causes of red or dark urine:

- Haemoglobinuria: dipstick-positive but no red cells on microscopy.
- Myoglobinuria.
- Food, e.g. beetroot.
- Drugs, eg rifampicin, nitrofurantoin, senna.
- Porphyria: urine darkens on standing.
- Bilirubinuria: obstructive biliary disease.

Causes of hematuria:

The most common causes of hematuria are:

- Urinary tract infection with viruses, other sexually transmitted diseases (particularly in women) or some bacterial species including strains of EPEC and Staphylococcus saprophyticus
- Bladder stones
- Kidney stones or ureter stones
- Benign prostatic hyperplasia, in older men, especially those over 50 years ***(Childs and Stanley, 2008).***

Other, less common causes of hematuria include:

- IgA nephropathy ("Berger's disease") occurs during viral infections in predisposed patients
- Trauma (e.g., a blow to the kidneys)
- Tumors and/or cancer in the urinary system, for example bladder cancer or renal cell carcinoma
- Kidney diseases
- Urinary Schistosomiasis (caused by Schistosoma haematobium) - a major cause for hematuria in many African and Middle-Eastern countries;
- Prostate infection or inflammation (prostatitis) ***(Hebert, et al., 2006).***

Rare causes include:

- Benign familial hematuria.
- Paroxysmal nocturnal hemoglobinuria - a rare disease where hemoglobin of hemolyzed cells is passed into the urine.
- Sickle cell trait can precipitate large amounts of red blood cell discharge, but only a small number of individuals endure this problem.
- Arteriovenous malformation of the kidney (rare, but may impress like renal cell carcinoma on scans as both are highly vascular).
- Nephritic syndrome (a condition associated with post-streptococcal and rapidly progressing glomerulonephritis)
- Fibrinoid necrosis of the Glomeruli (as a result of malignant hypertension).
- Vesical varices may rarely develop secondary to obstruction of the inferior vena cava ***(Koshy et al., 2009).***
- Allergy may rarely cause episodic gross hematuria in children ***(Graham et al., 2002).***
- Left renal vein hypertension, also called "nutcracker phenomenon" or "nutcracker syndrome," is a rare vascular abnormality responsible for gross hematuria
- Ureteral Pelvic Junction Obstruction (UPJ) is a rare condition beginning from birth in which the ureter is blocked between the kidney and bladder. This condition may cause blood in the urine.